Nanosystems Engineering Research Center for
Nanotechnology-Enabled
Water Treatment

CEVE 565:
NanoEnvironmental Engineering for Teachers (NEET)
Virtual Course

Rice University Office of STEM Engagement

Syllabus

January 2021 – April 2021

Instructors

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Required Text (provided)

Madden, Andrew. Welcome to Nanoscience: Interdisciplinary Environmental Explorations, Grades 9-12. N.p.: National Science Teachers Association, 2011. Online.

Summary of Program

The NanoEnvironmental Engineering for Teachers (NEET) course is designed to serve AP environmental science teachers. The purpose of the program is to increase the content knowledge of educators and empower them to implement rigorous project-based engineering activities on the topic of water sustainability. We will accomplish this goal by mastering environmental science content and exploring the most effective proven "best practices" in educational pedagogy. *Every teacher participant is expected to engage in active discussions and analysis. This requires that every teacher participant complete and critically analyze readings and content activities and evaluate their classroom practices.*

Program Objectives

1. To think reflectively and critically about current virtual engineering teaching practice.
2. To improve secondary teachers' understanding of advance placement and state standards.
3. To facilitate the transformation of teacher practice through the exploration of best practices in educational pedagogy.
4. To disseminate NEWT research conducted at Rice University, Yale, The University of Texas-El Paso, and Arizona State University.

5. To support NEET participants in the application of problem-based learning and engineering practices.

Program Expectations

Participants are expected to complete all components of NEET:

1. Attendance and participation
2. Pre- and post-tests/surveys
3. Program assignments
4. Forum Discussions/Participation
5. End-of-program presentation

Stipends will be awarded to reflect the completion of all of these components. Failure to complete any program element in full or in part will result in a prorated stipend.

Stipend Disbursements

Final stipends are not requested until after post-surveys have been received. Once we request stipends, it can take 2-6 weeks for checks to be processed, approved, cut, and mailed to you. Stipends are sent to the address you provided when you uploaded your W-9. If you move before we receive post-surveys, or you need to change your mailing address, you need to notify us and upload a new W-9 online. Notifications for address changes and any other inquiries regarding stipends must be sent to stem@rice.edu.

Safety Regulations

You must wear the following Personal Protective Equipment (PPE) at all times while in the lab (**no exceptions**)

- Long-sleeved, knee-length lab coat
- Safety glasses/goggles
- Clothing that fully covers yourself to the ankle (pants are best)
- Closed-toe shoes with backs (full coverage shoes are best, high heels are discouraged)

Based on the experiment or procedure, additional PPE such as gloves may be required. Laboratory gloves should only be worn inside the laboratory. Furthermore, the instructor or lab assistant must always be physically present for you to work in the lab. ***You will not be allowed to work in the lab if you fail to meet these safety regulations.***

Attendance

You are expected to attend all course sessions. ***Please sign in and out on the attendance sheet at each class session.*** If class schedule conflicts arise, please contact Christina Crawford as soon as you can.

Surveys

Participants are required to complete several pre-tests and post-tests during the course as well as institute evaluation surveys.

- Pre- Teaching Engineering Self-Efficacy Survey
- Post- Teaching Engineering Self-Efficacy Survey
- End of Course Feedback Survey
- Diversity & Inclusion Survey
- Fall Classroom Implementation Survey (next semester after course as ended)

Assignments

Assignments are designed for participants to reflect and apply the knowledge gained in their classrooms. Completing readings, notes, or annotations are a must so that you will have material to facilitate discussion

every week. Any participant with special needs or concerns is requested to speak with one of the instructors as soon as possible. All meetings will remain confidential.

Project-based Development

Throughout the program, participants will engage in discussions to design a new product/idea utilizing the engineering design model. Choosing an environmental science-related case-study, participants will work in teams to create or update a solution that will address their chosen issue. The NEET staff and contractors will work with participants to assist them in developing their idea and re-designing. Both in and out of class time will be necessary for completing the projects.

Disability Statement

Any student with a documented disability needing academic adjustments or accommodations should speak with me during the first day of class after class or during office hours. All discussions will remain confidential. I will try to make whatever accommodations are necessary. You will also need to contact Disability Support Services in the Ley Student Center to register. (http://students.rice.edu/students/Disability.asp).

Title IX Responsible Employee Notification

Rice University cares about your wellbeing and safety. Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination, or gender discrimination or relationship, sexual, or other forms of interpersonal violence to seek support from The SAFE Office.

At Rice University, unlawful discrimination in any form, including sexual misconduct, is prohibited under Rice Policy on Harassment and Sexual Harassment (Policy 830) and the Student Code of Conduct. As the instructor and a responsible employee, I am required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to the Title IX Coordinator on campus. Although responsible employees are required to make this notification, it is the student's choice to pursue a formal complaint. The goal is to make sure that students know the range of options available and have access to the resources when in need. For more information, please visit safe.rice.edu, titleixrice.edu, or email titleixsupport@rice.edu.

Honor Code

Established in 1912, the Honor Code is one of Rice's academic experience's most distinct aspects. Everyone who enrolls at Rice agrees to abide by the code, which covers such matters as plagiarism and giving or receiving aid on exams. Work completed under the Honor Code carries the pledge cited below, followed by the student's signature. The Honor Code fosters a spirit of freedom, independence, honesty, and mutual trust that exemplifies the academic enterprise at its best. Students can schedule final exams in most courses when they want them, rather than having two exams on the same day or three or four in a row.
In many cases, exams may be taken in the library or the students' rooms. Exams for large classes are scheduled for specific times, but even those are not proctored. The student-elected Honor Council oversees the Honor Code and considers reported violations.

"On my honor, I have neither given nor received any unauthorized aid on this (exam, quiz, paper)."

Spring Session Dates

Thursday Sessions: 6:00 pm – 9:00 pm CST; Via Zoom

NanoEnvironmental Engineering for Teacher Session Dates				
DATE	**TOPICS *(tentative)***	**OBJECTIVE *(tentative)***	**Asynchronous**	**HOURS**
January 14, 2021	Welcome to NEET	• Pre Assessments • Scavenger Hunt & Nanotechnology Intro • Syllabus & NEET Discussion • Closing & Homework	• Watch Jorge's Discussion	**3**
January 21, 2021	NEWT Content	• NEWT Overview - Dr. Pedro Alvarez • NEET Case Studies - NEWT SLC • CATME Results - Meet your team - @ home team challenge	• Why NEWT Challenges	**3**
January 28, 2021	Engineering Design	• Design Challenge • What is the engineering design process? • Filtering & Failures	• Read Chapters 1-3 of textbook	**3**
February 4, 2021	NEWT Content	• What type of water is this. - Data analysis (provide images looking similar - Inquiry-based)	• Independent Review of Case Studies	**3**
February 11, 2021	NEWT Content	• Photocatalytic Inquiry	• Potential Effects of Nanosilver on a Bacteria Population	**3**
February 18, 2021	Engineering Design	• Case Study Selection • Problem Statement/ Defining - Discussion	• Defining the Problem	**3**
February 25, 2021	NEWT Content	• Faculty Talk _ Dr. Jorge Gardea - Torresdey • SLC Mentor - Case Study Deep Dive	• Finalize team Problem statement	**3**
March 4, 2021	Engineering Design Diversity, Equity, & Inclusion	• Importance of DEI & Community Perspectives in Engineering • Problem Statement Presentation & Feedback	• Independent brainstorming of solutions	**3**
March 11, 2021	Engineering Design	• Brainstorming & Techniques (add 30 circles, hats) • Team Brainstorming of Possible Solutions	• Select a Solution	**3**
March 25, 2021	Engineering Design	• SLC Mentors & Materials List (due) and Prototype Sketch	• Prototype Design	**3**

April 1, 2021	Engineering Design	• Virtual Team Build	• Virtual Team Build	**3**
April 8, 2021	Engineering Design	• Prototype data collection & analysis	• Potential Modification	**3**
April 15, 2021	Engineering Design	• Communicating to Technical & Non-technical audiences	• Poster Development	**3**
April 22, 2021	Project Showcase	• Group Project Presentations • Post Testing	• Engineering Posters & showcase • Peer Feedback	**3**
			TOTAL	**45**